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Subspecies of the Milliped *Apheloria trimaculata* (Wood) (Polydesmida: Xystodesmidae)

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For three years I have been assembling notes and specimens for a revision of the milliped genus *Apheloria*. However, it appears that completion of this project may be unavoidably delayed for an indefinite period of time; because of this development I wish to present separately a part of the accumulated information, in accordance with a desire to keep the status of the Virginia milliped fauna as up-to-date as possible.

Apheloria trimaculata was described in 1864 by Dr. Horatio C. Wood, who based his short but accurate description on two specimens collected in northeastern Pennsylvania by E. D. Cope. The subsequent history of the species is like that of most other American diplopods described in the last century, being nominally mentioned in various faunal lists and referred to in descriptions of new species. It has accumulated a number of erroneous literature references and one synonym. Much of the confusion has been due to the fact that most writers have had only preserved and faded specimens for study. Actually, *trimaculata* is a very distinctive species, with a definite geographic range similar to those of many other animal forms peculiar to the Appalachian region.

The phenomenon of subspeciation, in which slightly different populations occupy vicarious areas throughout the range of a species, has not previously engaged the attention of most workers on diplopods. From the experience I have had, however, it seems that subspecies may eventually be recognized in the diplopods to the extent currently developed, for instance, in reptiles. This paper is concerned with the geographic races of a fairly common, widespread milliped of eastern United States.

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"The "subspecies" of European myriapodists, although referred to as such and designated by trinomials, are generally nothing more than individual variations or aberrations which have no definite range and may occur at widely separated localities.

In 1947 I spent some time in Susquehanna County, Pennsylvania, in an attempt to obtain topotypes of *trimaculata*. In this I was not successful, but feel confident that trimaculate specimens from nearby places in New York State represent Wood's species, especially since there is apparently only one form of milliped in northeastern United States which answers to the original description. Because of this, I can see no immediate necessity for the designation of neotype or lectotype specimens.

Since an extended account of *trimaculata* is contemplated for inclusion in the forthcoming revision, no full description of the species is given at this time. Citations are given below to figures of the male gonopods.

The synonymy of *A. t. trimaculata* as given below includes only the more important references.

Genus *Apheloria* Chamberlin

Apheloria Chamberlin, 1921, Canadian Entomologist, vol. 53, p. 232. Generotype, *Fontaria montana* Bollman.

Apheloria trimaculata trimaculata (Wood)

Polydesmus (*Fontaria*) *trimaculata* Wood, 1864, Proc. Acad. Nat. Sci. Philadelphia, p. 6; 1865, Trans. Amer. Philos. Soc., ser. 2, vol. 13, p. 223, fig. 53, 54.

Fontaria trimaculata Bollman, 1887, Proc. U. S. Nat. Mus., vol. 10, p. 662.

Apheloria trimaculata Attems, 1938, Das Tierreich, lief. 69, p. 170. Hoffman, 1949, Proc. U. S. Nat. Mus., vol. 99, p. 378.

Fontaria lutzi Jacot, 1938, Amer. Midl. Nat., vol. 20, no. 3, p. 571, fig. 1, 2. *Apheloria coriacea* (nec C. Koch) Chamberlin, 1947, Proc. Acad. Nat. Sci. Philadelphia, vol. 99, p. 25, fig. 5.

Diagnosis. Male gonopod with hooklike prefemoral process borne on a small lateral shoulder; telopodite slender, bent laterad and then mesiad forming a complete loose circle. A slight dilation of the tibiotarsus just proximad to the end. Dorsum glossy black, with three yellow spots on each tergite, a triangular one on the caudolateral half of each keel and a somewhat smaller semicircular one at the middorsal line.

Type Locality. Susquehanna County, Pennsylvania. Present location of types, if extant, unknown.

Range. From Clifton Forge, Alleghany County, Virginia, north through the Appalachian Mountains to western New York, Vermont, and Massachusetts. I have material from seven counties in western Virginia, all north of

the James River, which at present may be regarded as the southern limits of the typical subspecies.

As is often the case with vertebrate animals, *trimaculata* manifests a striking variational gradient in size, in this case increasing from north to south. Virginia material frequently attains a length of 55 mm., whereas the specimens seen from New York do not exceed 40 mm. in length. There is no variation, however, in color pattern or structural characters.

Remarks. In 1938, Jacot, apparently overlooking the proposal of *Aphe- loria* by Chamberlin in 1921, described a member of the genus to which he gave the name *Fontaria lutzi*. This species, from southern New Hampshire, was said to be like *trimaculata* in coloration, but differing greatly in gonopod structure. Jacot used the brief account of *F. trimaculata* by Williams and Hefner (1928, Ohio Biol. Surv., Bull. no. 25, p. 108) for comparison with *lutzi*, and was quite correct in noting the difference in gonopods. This is mainly because the Ohio form of Williams and Hefner is not the same as Wood's. I have examined material, kindly sent to me by Dr. R. A. Hefner, and find it represents an undescribed genus and species. Jacot's description and drawing of *lutzi*, on the other hand, are quite typical of *trimaculata*.

In a recent paper (1947, *op. cit.*) Chamberlin refers a number of speci- mens in the collection of the Philadelphia Academy to *A. coriacea* (Koch), although his figure given for that species actually represents a gonopod of *trimaculata*. Chamberlin mentioned that some of the specimens have the pattern as described for *trimaculata* despite the fact that *coriacea* is always cross-banded dorsally. I have re-examined this material and find it perfectly typical *trimaculata*.

Aphe loria trimaculata antrostomicola Hoffman

Aphe loria antrostomicola Hoffman, 1949, Proc. U. S. Nat. Mus., vol. 99, p. 372-374, pl. 26, fig. 1, 2.

Diagnosis. Similar to *A. t. trimaculata* in gonopod structure, tibiotarsus with the subterminal dilation less pronounced. Dorsum black with the median spots reddish and tending to contact the yellow spots on the keels.

Type Locality. Stull's Cave, about 7 miles southwest of Lowmoor, Alleghany County, Virginia. Type specimens, U. S. Nat. Mus. 1802 and my personal collection.

Range. Known only from the type locality and immediate vicinity within a three-mile radius, in the southwestern part of Alleghany County, Virginia.

Remarks. I have not yet obtained definite intergrades between this form and typical *trimaculata*, which occurs less than ten miles to the north, but considering the variability of color pattern in certain other trimaculate xystodesmids, notably *Cherokia georgiana* (Bollman), I have no hesitation in regarding *antrostomicola* as only a localized terminal race of the more widespread parent form. This subspecies would have been originally described as such, had I been sure at the time that my Virginia material of *trimaculata* was conspecific with Wood's Pennsylvania form.

Apheloria trimaculata incarnata, new subspecies

Figure 1a

Diagnosis. Very similar to *A. t. trimaculata* in structural characters, differing chiefly in the color pattern. Dorsum black or dark brown, the spots bright pink in life instead of yellow, and those of the median series tend to be much larger, 40 per cent or more the width of the entire metatergite. The two spots of the collum are broadly fused, producing a wide hourglass-shaped mark.

Type Locality. Gull Lake, near Arden, Frontenac County, Ontario. Holotype U. S. Nat. Mus. 1891; three topoparatypes are in my personal collection; all were collected on September 4, 1948, by Ralph E. Crabill, Jr., to whom I am greatly indebted for numerous valuable specimens.

Range. Known so far only from the type locality, which is in the lake region of eastern Ontario. A wide distribution over southeastern Canada is to be expected.

Remarks. In this northern terminal race we have an approach to the southernmost counterpart, *A. t. tortua*, in pattern. The subspecies of *trimaculata* are all very similar as regards male gonopods. My figures (1949, *op. cit.*) of *antrostomicola* and *picta* (= *tortua*) are inaccurate and somewhat exaggerated, and Chamberlin's drawing of the gonopod of *tortua* not especially useful. I am now convinced that the pattern differences alone can be relied upon for distinction of the forms. While subject to a little variation, the color of the living animals is so distinctive as to eliminate all doubt as to its taxonomic value. Mr. Crabill was impressed by the difference between *trimaculata* at Ithaca, New York, and the Ontarian *incarnata*.

The nature of the collum marking seems to be a very good character. In the hundred or more living or freshly preserved specimens of *trimaculata* I have seen from New York and Virginia, all have the two median spots

well separated (or the posterior spot missing). The few specimens of *incarnata* uniformly show the broad fusion of the two spots.

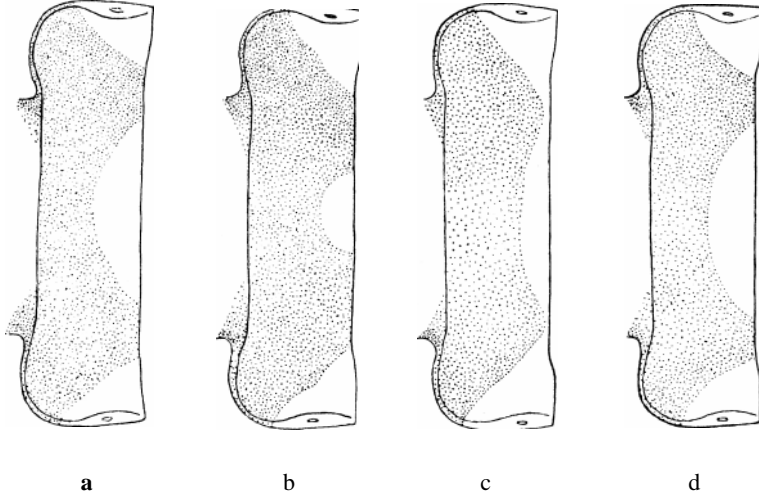


Figure 1. Midbody tergites of the four subspecies of *Apheloria trimaculata*, showing typical color patterns. (a) *A. t. incarnata*, from holotype, Gull Lake, Ontario, actual width 7 mm. (b) *A. t. trimaculata*, Ithaca, New York, actual width 7 mm. (c) *A. t. antrostomicola*, from paratype, Alleghany County, Virginia, actual width 8 mm. (d) *A. t. tortua*, from topotype, Mountain Lake, Virginia, actual width 9 mm.

Apheloria trimaculata tortua Chamberlin

Apheloria trimaculata Loomis, 1944, *Psyche*, vol. 51, p. 175.

Apheloria tortua Chamberlin, 1949, *Journ. Washington Acad. Sci.*, vol. 39, no. 3, p. 101, fig. 23 (March).

Apheloria picta Hoffman, 1949, *Proc. U. S. Nat. Mus.*, vol. 99, p. 376-378, pl. 26, fig. 5, 6 (June).

Diagnosis. Generally similar to *A. t. trimaculata*, but differing in color pattern as follows: lateral series of spots bright yellow and somewhat reduced in size; median spots red, orange, or chestnut, occupying most of the metazonite. Subterminal dilation of male gonopod slightly larger than in *trimaculata*.

Type Locality. Mountain Lake, Giles County, Virginia. Type in collection of Dr. R. V. Chamberlin, University of Utah. Types of *A. picta*, U.S.N.M. 1804, and collection of the author.

Range. Known only from the type locality and vicinity, where the species seems to be abundant on Salt Pond Mountain at elevations exceeding 3400 feet.

Remarks. In my 1949 paper cited above, I suggested (p. 378) that this species and *antrostromicola* might be only subspecifically distinct; the acquisition of more material and a better appreciation of the variation in xystodesmids convinces me that this is really the case. However, the two seem to be separated horizontally and vertically; no specimens have yet been found in the area between the ranges of the two.

Key to the subspecies of *Apheloria trimaculata*.

- 1a All three rows of dorsal spots of the same color 2
- 1b Median row of spots reddish, lateral rows yellow 3
- 2a Spots reddish-pink, those of median series large, as much as 40 per cent or more the width of the tergite; the two spots of the collum fused into an hourglass-shaped mark (Ontario) *A. t. incarnata*.
- 2b Spots bright lemon yellow, those of the median series not enlarged, never as much as 30 per cent of the width of the tergite; the two collum spots never fused, the posterior spot sometimes absent (Virginia to New York and Massachusetts) *A. t. trimaculata*.
- 3a Median spots rather thin, extending along caudal edge of tergite and tending to be in contact with the spots on the keels (Virginia) *A. t. antrostomicola*.
- 3b Median spots nearly semicircular, occupying much of the tergite (exclusive of keels), never in contact with the lateral rows of spots *A. t. tortua*.

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